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Commissioner of Patents and Trademarks  
Washington, D. C. 20231

Dear Sir:

Enclosed is the patent application of Meldon L. Talbot, 4671 Devonshire Street, Boulder, Colorado 80301, entitled "Ankle Brace", consisting of a one page cover, five (5) pages of specification, four (4) pages of claims (Nos. 1-12), a one page Abstract, and one page of informal drawings (Figures 1-5).

Also enclosed are the executed (1) Declaration for Patent Application and (2) Verified Statement Claiming Small Entity Status - Independent Inventor.

This application is a continuation-in-part of Serial No. 08/878,181 filed June 18, 1997 in the name of the same inventor.

Enclosed is a check in the amount of \$355.00 for the filing fee which is calculated as follows:

Basic Filing Fee	\$355.00
Claims (12)	\$ -0-
Independent claims (2)	\$ -0-
Multiple dependent claims - No	\$ -0-
Total Fee:	\$355.00

Any additional fee due may be charged to Deposit Account No. 09-0948. A duplicate of this letter is attached.

Respectfully submitted,

*Edward S. Irons*  
Edward S. Irons  
Registration No. 16,541

ESI/vgc  
Enclosures

cc: Meldon L. Talbot (letter only)



09/706992

Applicant/Patentee: Meldon L. Talbot  
Serial No.: To be Assigned  
Filed: Herewith  
For: Ankle Brace

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY  
STATUS (37 CFR 1.9(f) AND 1.27(b)) — INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code to the United States Patent and Trademark Office in regard to the invention entitled Ankle Brace by inventor(s) Meldon L. Talbot described in the application filed herewith.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a non-profit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed, or licensed, or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

☒ No such person, concern or organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the patent to which this verified statement is directed.

NAME OF PERSON SIGNING Meldon L. Talbot  
SIGNATURE Meldon L. Talbot DATE 11/1/00

PATENT APPLICATION OF  
MELDON L. TALBOT  
4671 DEVONSHIRE STREET  
BOULDER, COLORADO 80301

FOR

ANKLE BRACE

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## ANKLE BRACE

This application is a continuation-in-part of United States application Serial No. 08/878,181 filed June 18, 1997.

### BACKGROUND OF THE INVENTION

This invention relates to the art of orthopedics, and more particularly to an ankle brace.

Prior inventors have developed a number of braces in the form of straps or webs intended to be wound about the ankle in one way or another. The free end or ends of the material are often secured by fasteners such as "Velcro" (generically: hook and loop fasteners) so that the brace remains tight and secure about the ankle.

In U.S. Patent No. 4,085,746, Castiglia described an ankle wrap in the form of an elongated panel having Velcro-type fasteners along its length. The panel was made of an elastic material, specifically intended to brace the ankle joint without restricting walking and running movements.

Baker, in his U.S. Patent No. 3,506,000, disclosed an ankle support having an inelastic body which lay behind the heel, but the body was secured to the foot by distinct elastic straps which were interconnected after they had been wrapped around the foot.

The Wise Patent, No. 3,777,751, has a substantially inelastic, flexible strap with Velcro fasteners and a "tongue". The strap loops around the ankle but the tongue must be secured to the lower leg, above the ankle, with adhesive tape or a "fastened gauntlet or collar". This brace is not a figure-eight type and requires some type of auxiliary attachment to the lower leg, either adhesive tape or a second gauntlet or collar.

An ankle support having non-stretch fabric components is shown in Patent No. 5,090,404, but the construction is complex, including a foam under liner and numerous parts requiring assembly by sewing. U.S. Patent No. 3,490,450 discloses a brace made

of canvas, and No. 4,753,228, includes components of "limited elasticity". Neither, however, is a figure-eight type brace.

Prior wrapped braces of the figure-eight type are uniformly elastic, probably on the theory that elasticity is necessary to permit movement of the ankle, and for comfort. I have found, however, that better support is provided by such an ankle brace made of a substantially inelastic material, and that one can achieve acceptable levels of comfort with an inelastic yet flexible web wrapped in a figure-eight configuration about the foot and ankle. This ankle brace can be worn directly on the foot and ankle, or over a normal stocking for more comfort and equal support.

#### SUMMARY OF THE INVENTION

An object of the invention is to provide a flexible but inelastic brace for supporting the ankle.

Another object of the invention is to provide an effective ankle brace that is comfortable enough to wear all day, every day, for people with unstable ankles as well as during participation in sports or other physically demanding activities.

Another object of the invention is to simplify the manufacture and application of an orthopedic ankle brace.

These and other objects are attained by an ankle brace formed of a single strap made of a substantially inelastic non-adhesive material of sufficient length to be wrapped at least once in a figure-eight configuration about the ankle and foot. One loop of the figure-eight passes around the back of the ankle, one loop passes under the foot in front of the heel, and the strap crosses above the foot. The strap has fasteners, preferable "Velcro", for securing the free end of the strap to the wrapped portion to maintain tension in the strap and to retain the brace on the foot and ankle. The ankle brace is equally effective whether worn inside or outside of a normal stocking.

### BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings,

Figure 1 is a perspective view, from above of an ankle brace embodying the invention, applied to a patient.

Figure 2 is a side elevation thereof showing the preferred location of the hook and loop fasteners on a fully wrapped foot and ankle.

Figure 3 is a bottom plan view thereof.

Figure 4 is a plan view of one side of the brace, laid out flat, showing the preferred location of the array of hooks.

Figure 5 is a plan view of the opposite side of the brace, laid out flat, showing the preferred location of the array of loops.

### BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENT

An ankle brace embodying the invention is shown in Figures 1 – 5. It comprises a single strap 10 made of a substantially inelastic yet flexible material, preferably of non-adhesive, constant-width web of a strong fabric. The fabric may be woven of a strong natural fiber such as cotton or linen, or a synthetic material such as nylon. The choice of material and choosing the dimensions of the strap for wrapping a foot of a particular size are matters of ordinary skill. This strap must be long enough to be wound in a figure-eight configuration completely about the ankle and foot, as shown in Figures 1 – 3, preferable at least once, and possibly more than once. Tension is maintained on the strap as it is wrapped; the tension is held until the free end of the strap has been secured to the outer surface of the strap. While hardware fasteners may be suitable, a hook and loop fastener is preferred because of its reliability, strength, great degree of adjustability, flexibility and comfort.

A hook and loop fastener comprises two complementary parts: one part with an array of plastic loops and another part with an array of plastic hooks for engaging the loops. In this invention, one of those parts is disposed on a free end of the web, and its counterpart is placed elsewhere of the web in a position permitting the parts to be pressed together when the strap has been wrapped about the foot and ankle. For example, as shown in Figures 4 - 5, the loop portion 20 may be on one side of the strap, in a position which will correspond to the outside of the brace, see Figure 5. The loop portion 20 preferably covers all of the outside of the brace but may cover any portion of the outside of the brace on the condition that at least 1 – 5 inches of the end opposite and side opposite of the hook portion 30 of the brace is covered with loops. The hook portion 30 on the opposite side of the loops preferably covers 1-5 inches of one end of the strap, see Figure 4, but may cover any portion of the strap on the condition that the hooks 30 are on the side opposite and end opposite of the loops 20. When the brace is wrapped about the foot and ankle in Figure 2 the loop portion 20 is on the outside of the brace, near the inside ankle bone "A" of the foot. In this example, a patch of hook material 30 is sewn or otherwise applied to the one free end of the strap, on the inner surface, so that it can be pressed down against the loop-bearing end to hold the brace in place.

Alternatively, the entire length of the strap may be provided with hooks or loops on the first side, to simplify manufacture and installation. This could be achieved by attaching a full-length fastener part to one side of the strap, or by making the strap from a unitary stock material already having loops or hooks formed over one entire surface. The entire opposite side may be formed with hooks if loops were used on the first side or loops if hooks were used on the first side, if that does not prove uncomfortable; otherwise, small hook-bearing patches can be sewn to at least one of the ends of the strap on the side opposite from the loops, see Figures 4 - 5.

In use, the strap is wrapped preferably at least once, possible more than once, about the ankle and foot in a figure-eight configuration. Said figure-eight begins at the inside of the ankle, crosses over the medial arch, loops below the foot in front of the heel, crosses over itself above the medial arch, and loops around the back of the ankle and fastens to itself at said beginning end of said figure eight configuration at the inside of the ankle. The strap is maintained in tension while the ankle is wrapped; when the desired number of turns have been taken, the fastener patch 30 on the free end of the strap is pressed against the loops 20 on the outside of the wrapping to secure the brace. For additional comfort, the ankle brace can be worn over a normal stocking with equal support.

Since the invention is subject to modifications and variations, it is intended that the foregoing description and the accompanying drawings shall be interpreted as only illustrative of the invention defined by the following claims.



I CLAIM:

1. A single strap ankle brace comprising a strap having a first and a second end,

wherein said single strap ankle brace is made of a flexible substantially inelastic web of fabric,

an array of plastic hooks disposed at only one of said first and second ends of said strap,

an array of plastic loops for engaging said array of plastic hooks,

said array of plastic loops being spaced on a surface of said strap,

wherein said array of plastic hooks is separated and spaced apart on said strap from said array of plastic loops such that said array of plastic hooks and array of plastic loops may be pressed together when said strap is wrapped about the ankle and foot in a figure eight configuration which exposes said array of plastic loops, and

wherein said figure eight configuration begins at the inside of the ankle, crosses over the medial arch, loops below the foot in front of the heel, crosses over itself above the medial arch, and loops around the back of the ankle and fastens to itself at said beginning end of said figure eight configuration at the inside of the ankle.

2.. The single strap ankle brace of claim 1 wherein said array of plastic hooks and said array of plastic loops are disposed on opposite sides of said strap.

3. The single strap ankle brace of claim 1 made of constant width fabric.

4. The single strap ankle brace of claim 1 made of non-adhesive material

5. A method for bracing an ankle and associated foot which comprises:

(i) providing the single strap ankle brace of claim 1;

- (ii) wrapping said single strap ankle brace around the ankle and associated foot in a figure eight configuration,

wherein said wrapping comprises:

- (a) positioning said end of said strap on which no array of plastic hooks is disposed;
- (b) then passing a length of said strap at least once around the foot passing under the foot in front of the heel to provide one loop of said figure eight configuration then passing across a section of said strap above the foot and then around the back of the ankle to provide the other loop of said figure eight configuration,

wherein said wrapping exposes said array of plastic loops, and

wherein said wrapping provides a free end of said strap upon which an array of plastic hooks is disposed; and

- (iii) pressing said array of plastic loops exposed by said wrapping together with said array of plastic hooks on said free end of said strap.

6. A method for bracing an ankle and associated foot which comprises:

- (i) providing the single strap ankle brace of claim 1;
- (ii) wrapping said single strap ankle brace around the ankle and associated foot in a figure eight configuration,

wherein said figure eight configuration begins at the inside of the ankle, crosses over the medial arch, loops below the foot in front of the heel, crosses over itself above the medial arch, and loops around the back of the ankle and fastens to itself at said beginning end of said figure eight configuration at the inside of the ankle.

7. A single strap ankle brace comprising a strap having a first and a second end,

wherein said single strap ankle brace is made of a flexible substantially inelastic web of fabric,

an array of plastic hooks disposed at only said first end of said strap,

an array of plastic loops for engaging said array of plastic hooks,

said array of plastic loops being spaced on a surface of said strap,

wherein said array of plastic hooks is separated and spaced apart on said strap from said array of plastic loops such that said array of plastic hooks and array of plastic loops may be pressed together when said strap is wrapped about the ankle and foot in a figure eight configuration which exposes said array of plastic loops, and

wherein said figure eight configuration begins at the inside of the ankle, crosses over the medial arch, loops below the foot in front of the heel, crosses over itself above the medial arch, and loops around the back of the ankle and fastens to itself at said beginning end of said figure eight configuration at the inside of the ankle.

8. The single strap ankle brace of claim 7 wherein said array of plastic hooks and said array of plastic loops are disposed on opposite sides of said strap.

9. The single strap ankle brace of claim 7 made of constant width fabric.

10. The single strap ankle brace of claim 7 made of non-adhesive material.

11. A method for bracing an ankle and associated foot which comprises:

- (i) providing the single strap ankle brace of claim 7;
- (ii) wrapping said single strap ankle brace around the ankle and associated foot in a figure eight configuration;

wherein said wrapping comprises:

(a) positioning on the inside of the ankle said end of said strap on which no array of plastic hooks is disposed;

(b) then passing a length of said strap at least once around the foot passing under the foot in front of the heel to provide one loop of said

figure eight configuration then passing across a section of said strap above the foot and then around the back of the ankle to provide the other loop of said figure eight configuration,

wherein said wrapping exposes said array of plastic loops, and

wherein said wrapping provides a free end of said strap upon which an array of plastic hooks is disposed; and

- (iii) pressing said array of plastic loops exposed by said wrapping together with said array of plastic hooks on said free end of said strap.

12. A method for bracing an ankle and associated foot which comprises:

- (i) providing the single strap ankle brace of claim 7;
- (ii) wrapping said single strap ankle brace at least once around the ankle and associated foot in a figure eight configuration,

wherein said figure eight configuration begins at the inside of the ankle, crosses over the medial arch, loops below the foot in front of the heel, crosses over itself above the medial arch, and loops around the back of the ankle and fastens to itself at said beginning end of said figure eight configuration at the inside of the ankle.

### ABSTRACT OF THE DISCLOSURE

An ankle brace includes a single strap made of a substantially inelastic and flexible, non-adhesive material of sufficient length to be wrapped in a figure-eight configuration at least once about the ankle and foot, with one loop of the figure-eight passing around the back of the ankle, one loop passing under the foot in front of the heel, and the strap crossing above the foot. Hook and look fasteners secure one free end of the strap to the other end portion thereof to maintain tension in the strap and to retain the brace on the foot and ankle. The ankle brace can be worn under or over a stocking with equal support.



DECLARATION FOR PATENT APPLICATION

As below named sole inventor, I hereby declare:

My residence, post office address and citizenship is as stated below next to my name.

I believe that I am the original, first inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled "Ankle Brace", the specification of which is filed herewith.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

<u>Serial No. 08/878,181</u>	<u>6/18/97</u>	<u>Pending</u>
(Appl./Serial No.)	(Filing Date)	(Status)

I hereby appoint the following attorney to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Edward S. Irons, Reg. No. 16,541

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**Figure 6.** The effect of the number of iterations on the accuracy of the proposed algorithm. The figure shows two plots side-by-side. The left plot shows the error rate (Y-axis, ranging from 0.0 to 0.8) versus the number of iterations (X-axis, ranging from 0 to 10). The right plot shows the error rate (Y-axis, ranging from 0.0 to 0.8) versus the number of iterations (X-axis, ranging from 0 to 10).

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